ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	Eczacıbaşı Building Products (Faucets)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ECZ-20130187-IAC1-EN
Issue date	23.09.2013
Valid to	22.09.2018

Brass Bathroom Mixers

Eczacıbaşı Building Products (Faucets)

Institut Bauen und Umwelt e.V.

www.bau-umwelt.com / https://epd-online.com

1. General Information

Eczacibasi Building Products

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
GERMANY

Declaration number

EPD-ECZ-20130187-IAC1-EN

This Declaration is based on the Product Category Rules:

PCR 2011, Part A

Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Bathroom mixers and showers, from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. September 2012

PCR 2012, Part B

PCR Guidance-Texts for Building-Related Products and Services. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part B: Requirements on the EPD Bathroom fittings and showers, 07-2013.

(PCR tested and approved by the independent expert committee [SVA])

Issue date

23.09.2013

Valid to

22.09.2018

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Prof. Dr.-Ing. Hans-Wolf Reinhardt
(Chairman of SVA)

BrassBathroom Mixers

Owner of the Declaration

Eczacibasi Building Products (Faucets)
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TR-11300 Bozüyük -Bilecik
TURKEY

Declared product / Declared unit

1 kg Brass Bathroom Mixers

Scope:

Within this study a life cycle analysis according to ISO 14040/44 and EN15804 was performed for brass bathroom mixers products manufactured by Eczacıbaşı Building Products at the production plant located in Bozüyük-Bilecik-TURKEY. The life cycle analysis is based on the data declared by Eczacıbaşı Building Products. The EPD for brass bathroom mixers products is an average EPD which represents the life cycle analysis of brass bathroom mixers product group. This analysis relies on transparent, plausible and documented basis data. All the model assumptions which influence the results are declared. The life cycle analysis is representative for the products introduced in the declaration for the given system boundaries. The life cycle analysis covers the manufacturing of the products from cradle to gate.

Verification

The CEN Norm EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025
☐ internally ☒ externally

Patricia Wolf
(Independent tester appointed by SVA)

2. Product

2.1 Product description

Brass bathroom mixers consist of bathroom, shower and kitchen mixers, taps, drain systems and valves. Bathroom and kitchen mixers are separated to single lever and two handle models. Single lever mixers have only one cartridge. The user can adjust the temperature and the flow of hot or cold water using this mechanism. For other model, there are two open-close mechanisms (headworks). The temperature and the flow of hot and cold water must be regulated by using these separate headworks.

2.2 Application

Kitchen Mixers: Kitchen mixer is a plumbing fixture used to wash food, hands, kitchen devices/ accessories in a sink by mixing hot and cold water.

Basin Mixers: Basin mixer is a plumbing fixture used to wash hands in lavatories and bathrooms by mixing hot and cold water.

Bath and Shower mixer: Bath and shower mixers are plumbing fixtures used to take showers, by mixing hot and cold water.

Taps: Tap is a plumbing fixture used to wash hands in lavatories, toilets by providing flow of hot or cold water.

Drain System: Drain system is also a plumbing fixture used to discharge waste water which is produced during washing of hands, washing of hair, taking showers etc.

Valves: Valve is a plumbing fixture, used to control the flow of water to mixers, WC pans, bathrooms and kitchens.

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2.3 Technical Data

Before products are delivered to costumers the following control steps are performed to the mixers: Leakage tests, dimensional control, resistance to different type of chemicals, chemical analysis, hardness, desincification, resitance of brass alloy, neutral salt spray test, measurement of coating thickness, heat quench test, life wear tests, visual cosmetic control and flow rate tests. The procedures regarding these analyses are defined in relevant standards and all these tests are performed in compliance with these procedures described in the standards. The standards followed for performing these tests are declared in Chapter 2.4. All mixers are tested in delivery status and pass all of these tests. Main working range of mixers are described below table

Constructional data

Bath-Basin-Sink-Shower Mixers	Value	Unit
Maximum load temperature permanent operation	65	°C
Maximum load temperature temporary operation	90	°C
Flow rate (indications for pressure range of 1-3 bar)	0,54-1,2	m^3/h
Sound emissions	≤20	dB

2.4 Placing on the market / Application rules

Brass mixers comply with the standards of several countries:

- /TS EN 200/: Sanitary Tapware: General Technical Specifications For Single Taps And Mixer Taps
- /TS EN 248/: Sanitary Tapware - General Specifications For Electrodeposited Coatings Of Ni-Cr
- /TS EN 817/: Sanitary Tapware Mechanical Mixers (Pn 10)- General Technical Specifications
- /TS EN 246/: Sanitary Tapware - General Specifications For Flow Rate Regulators
- /TS EN 16091/: Sanitary Tapware Electronic Opening and Closing Tapware
- /BS EN 1982/: Copper And Copper Alloys - Ingots And Castings
- /BS EN 12164/: Copper And Copper Alloys- Rod For Free Machining Purposes
- /BS EN 12165/: Copper And Copper Alloys- Wrought And Unwrought Forging Stock
- /DIN 50930-6/: Corrosion of metallic materials under corrosion load by water inside of pipes, tanks and apparatus
- /DIN 50018/: Sulfur Dioxide Corrosion Testing in A Saturated Atmosphere
- /BS EN ISO 9227/: Corrosion Tests in Artificial Atmospheres Salt Spray Tests
- /BS EN 6988/: Metallic And Other Non - Organic Coatings -Sulfur Dioxide Test With General Condensation of Moisture
- /AS/NZS 2345/: Australıan Standard Dezincification Resistance Of Copper Alloys
- /AS/NZS 4020/: Testing Of Products For Use İn Contact With Drinking Water
- /AS/NZS 6400/: Water Efficient Products - Rating And Labeling

2.5 Delivery status

Eczacıbaşı Building Products' brass metal mixers, taps, valves etc. are delivered in 100% recycled carton boxes. The dimensions of the brass products, in delivery status are presented in the table below (Table 1).

Table 1. Dimensions of Brass Bathroom Mixers

	Brass Mixers	
	Minimum weigh (gram)	**Maximum weigh (gram)**
Sink Mixer	1450	2800
Bath and Shower Mixers	1525	5800
Basin Mixer	1450	3000
Tap	290	330
Drain System	215	590
Valves	270	490

2.6 Base materials / Ancillary materials

Brass bathroom mixers:

Main raw materials:

- Copper (Cu): 57-75 %
- Zinc (Zn): 28-40 %
- Lead (Pb): <1 %
- Aluminum (Al): <1%

Auxiliary substances / additives:

- Resin
- Silica sand core
- Lubricants
- Chemicals for electroplating (nickel and chrome plating) process

2.7 Manufacture

The manufacturing process of brass products is presented in Figure 1.

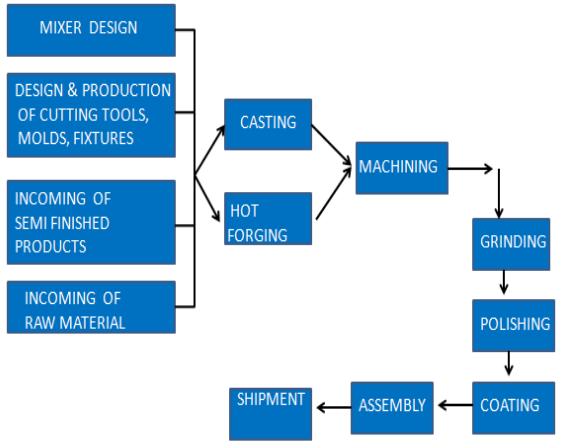

Figure 1: Manufacturing process

The production process starts with drawings that are prepared by the Product Development Department. Thereafter, three dimensional models, cutting tool and mould models are prepared. Different technologies are used in Eczacıbaşı Building Products' production.
Production of moulds, jigs, fixtures and cutting tool begins with design by using CAD/CAM/CAE programs. Simulation programs related to fluid mechanism and casting behavior of molten metals are used during the design stage. Those tools, moulds etc. are manufactured by CNC machines. Eczacıbaşı Building Products is a self –sufficient company in the field of manufacturing production equipment.
In the shaping of complex bodies, the casting method is used. For this purpose, semi-automatic die casting and low pressurized die casting techniques are used and the desired shape is obtained by pouring the melted brass metal at 1000°C into moulds.
The hot forging is the other shaping method of parts. It is the fastest method used in shaping of simple parts. Brass billets are heated up to 700-750°C and shaped with 200-350 tons of pressure.
Machining operations of cast, forged and bent parts are applied. There are CNC machines, universal transfer machines, multi spindle machining centers, horizontal and rotary type transfer machines to machine threads, holes, and sealing surfaces of parts.
All chrome plated and coated parts are subjected to grinding and polishing operations in order to obtain fine surfaces. Grinding and polishing operations are done by robots and manually-controlled machines.
Brass parts are plated with nickel and chrome to conform to standards.
Parts produced at the plant and procured from suppliers are assembled manually. There are 5 assembly lines and products are tested with the required test equipment at each assembly line. Final control of products before delivery to customer is conducted by the Quality Assurance department in this step.
Eczacıbaşı Building Products has achieved, in addition to product standards, the /ISO 9001 Quality Management System/.

With its successful Total Quality Management practices, Eczacıbaşı Building Products is a finalist of the Quality Award which is organized by TÜSİAD (Turkish Industry and Business Association) and KalDer (Turkish Society for Quality). Eczacıbaşı Building Products is also the winner of an award from the Japan Institute of Plant Maintenance TPM Excellence First Category.

2.8 Environment and health during manufacturing

Occupational health and safety

Health and safety of the employees, safety of working conditions, assessment, controlling, decreasing to an acceptable level of the existing potential risks, continuous improvement and conformity to legislation studies are conducted according to /TSE OHSAS (Occupational Health and Safety Management Systems) 18001/.

In 2012, the company was certified with /OHSAS 18001 (Occupational Health and Safety Management System)/.

Environmental protection

Eczacıbaşı Building Products has also achieved the /ISO 14001/ Environmental Management System.

Eczacıbaşı Building Products's environmental policy is based on the principle "Being aware of our responsibilities towards the environment and society, our aim is to bequeath a viable and clean environment to future generations".

Adopting a green approach, both to the production process and to products, protecting the environment and reducing the consumption of resources, such as raw materials, energy and water, are vital components of all processes.
Eczacıbaşı Building Products re-uses scrap metals, chips from production processes, recovers the waste heat of casting workshop and uses it for heating of other workshops in the facility. The company treats waste water from processes and biological waste water and reuses waste water from biological treatment. The water used for surface treatment is treated and prepared in a waste water treatment system on the factory site before being recycled for the production process. Biological waste water from toilets, showers is treated and used for trees, flowers and green areas in the factory garden.

The company has built a pellet repair station and begun repairing old pellets by reusing them in packaging.

Eczacıbaşı Building Products also began using TIG (Tungsten Inert Gas) welding technology to repair minor casting defects in place of re-melting at high temperatures and machining and polishing again.

Machine processing uses water-soluble coolants which are reused.

Moreover, Eczacıbaşı Building Products has started to treat waste sand from the casting process. The technology investments of energy for conscious usage and recycling to nature, responsibility of preserving natural resources starting from the production phase extending to all processes and recycling systems were developed to decrease wastes to a minimum.

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Eczacıbaşı Building Products measures its emission parameters and makes analysis of waste water from production processes.

2.9 Product processing/Installation
For installation, all necessary equipment is included inside of the package. Products such as basin and kitchen mixers are installed to basins or kitchen sinks via fastening nuts, fastening studs and wrenches. Products such as shower and bath mixers are installed to the wall via eccentrics. For installing built-in mixers, before plastering work, the concealed part is installed to piping. Plastering should be done according to maximum-minimum dimensions on the plastic housing. After plastering, the upper part is installed to the wall.

2.10 Packaging
For the packaging of brass bathroom mixers, corrugated cardboard, and low-density polyethylene (LDPE 04) are used. All packaging materials are recyclable. Pallets are repaired in the wood repair station and reused. Waste cardboard is sent to recovery units outside the factory.

2.11 Condition of use
Products are plated with chrome and nickel to increase the resistance of the surface to corrosion. They should be cleaned with the appropriate cleaning materials that are mentioned in the manual.

2.12 Environment and health during use
During the use stage, mixers and taps do not emit any pollutants or substances which are harmful to environment and health.

2.13 Reference service life
In the scope of this study the reference service life is not declared, since this EPD covers a variety of different products belonging to Eczacıbaşı Building Products product range. Unless there is conformity in the working conditions and cleaning methods, products can be expected to be usable for more than 20 years without losing their hygienic and functional properties.

2.14 Extraordinary effects
Fire
Faucets are not evaluated within the scope of /EN 13501-1/.They are solid products and non-flammable.

Water
Products do not react with water, do not dissolve or leak and do not carry the risk of spill over.

Mechanical Destruction
In case of mechanical damage, products may need to be replaced because of possible sharp cuttıng edges.

2.15 Re-use phase
Eczacıbaşı Building Products are not collected for the purposes of re-use or recycling.

2.16 Dısposal
According to the European Waste Catalogue and The Waste Code List of the Turkish Ministry of Environment and Urban Planning, metal wastes belong to the group of “construction and demolition wastes - copper, bronze, brass” (code: 17 04 01)
Material Safety Data Sheets are required for faucet body production.

2.17 Further Informatıon
Additional information about Eczacibasi Building Products’ design, production and management understanding, Bluelife® can be found at http:\\ www.vitrabluelife.com.tr

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit is 1 kg of brass bathroom mixers product. The average mass of one piece of the declared product is indicated in the table below.

Product Groups	Average Mass (kg)/piece	Conversion factor
Bath Mixer	1,92	0,52
Basin Mixer	1,07	0,93
Sink (Kitchen) Mixer	1,30	0,76
Shower Mixer	1,43	0,69
Tap	0,30	3,33
Valve	0,40	2,5
Drain System	0,55	1,81

3.2 System boundary
Type of EPD: *Cradle-to-gate*

The system boundary includes the production of brass bathroom mixers products from extraction of raw material to the production of finished packaged product at the factory gate (cradle to gate).
In this study, the product stage information modules A1, A2, and A3 are considered. These modules include production of raw material, extraction and processing (A1), processing of secondary material input (A1), transport of the raw materials to the manufacturer (A2), manufacturing of the product (A3) and the packaging materials (A3).

3.3 Estimates and assumptions
All estimations and assumptions regarding the cut off criteria and the allocation are declared within the related parts of this section 3 “LCA: Calculation rules”.
Assumption about wood pallets: Since the carbon release (Module A5) is not included within the product system, the wooden pallets are out of the scope to avoid misinterpretations. Anyways, pallets can be reused again. Thus, they enter and leave the product system without any burden within this study.

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3.4 Cut-off criteria

Criteria for the exclusion of inputs and outputs (cutoff rules) in the LCA and information modules and any additional information are intended to support an efficient calculation procedure. All inputs and outputs to a (unit) process are included in the calculation, for which data were available. There are some activities (for example: nickel & chrome plating) which are not considered in this study on the basis that their influence on the environmental impact is negligibly small (a concept known as materiality).

3.5 Background data

Background processes are taken from the publicly available professional /GaBi 6 databases/ as far as available. Country and region specific data on energy sources including electricity and region specific data on raw materials were taken from the GaBi databases.

3.6 Data quality

The process data and the used background data are consistent. In addition, the origin of the data is documented. Additional information is gathered regarding the age of the data.

The input and output data of the whole process plant was strongly emphasized. The supplied data (processes) were provided by Eczacıbaşı Building Products and checked for plausibility. Therefore, the data quality can be described as good.

3.7 Period under review

The period under review is defined as one year. The annual data is collected by the producer for production in the year 2011. The background data refers to years 2008 to 2011.

3.8 Allocation

A ‘Value of scrap’ process has been used to close the loop in copper and steel recycling. Since no End of Life stage has been modelled, an additional process is required to represent the input of secondary metal in brass production.

3.9 Comparability

As a general rule, a comparison or evaluation of EPD data is only possible when all of the data to be compared has been drawn up in accordance with /EN 15804/ and the building context or product-specific characteristics are taken into consideration.

4. LCA: Scenarios and additional technical information

No further scenarios have been declared. Therefore no additional scenario- or technical informations have been declared.

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1kg Brass Bathroom Mixers

Parameter	Parameter	Unit	A1-A3
GWP	Global warming potential	[kg CO2-Eq.]	9,2E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	9,9E-10
AP	Acidification potential of land and water	[kg SO2-Eq.]	1,1E-01
EP	Eutrophication potential	[kg (PO4)3-- Eq.]	4,3E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	5,9E-03
ADPE	Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	6,6E-03
ADPF	Abiotic depletion potential for fossil resources	[MJ]	1,2E+02
Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non fossil resources; ADPF = Abiotic depletion potential for fossil resources		

RESULTS OF THE LCA - RESOURCE USE: 1kg Brass Bathroom Mixers

Parameter	Parameter	Unit	A1-A3
PERE	Renewable primary energy as energy carrier	[MJ]	2,4E+01
PERM	Renewable primary energy resources as material utilization	[MJ]	0,0E+00
PERT	Total use of renewable primary energy resources	[MJ]	2,4E+01
PENRE	Non renewable primary energy as energy carrier	[MJ]	1,3E+02
PENRM	Non renewable primary energy as material utilization	[MJ]	0,0E+00
PENRT	Total use of non renewable primary energy resources	[MJ]	1,3E+02
SM	Use of secondary material	[kg]	8,7E-01
RSF	Use of renewable secondary fuels	[MJ]	3,4E-03
NRSF	Use of non renewable secondary fuels	[MJ]	3,8E-02
FW	Use of net fresh water	[m³]	1,3E+02
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Use of net fresh water		

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1kg Brass Bathroom Mixers

Parameter	Parameter	Unit	A1-A3
HWD	Hazardous waste disposed	[kg]	3,4E-08
NHWD	Non hazardous waste disposed	[kg]	2,0E-02
RWD	Radioactive waste disposed	[kg]	2,1E-03
CRU	Components for re-use	[kg]	0,0E+00
MFR	Materials for recycling	[kg]	0,00E+00
MER	Materials for energy recovery	[kg]	0,00E+00
EEE	Exported electrical energy	[MJ]	0,00E+00
EET	Exported thermal energy	[MJ]	0,00E+00
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy		

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6. LCA: Interpretation

The dominant contributor to all environmental impacts is the usage of electrical power in the manufacture of the armature. The contribution of copper production to the impact stands at about 24% of total global warming potential.
A detailed interpretation of the environmental impacts is described below.

The **GWP** is dominated by the use of electricity in armature production (52%) and additional external secondary copper being added to the brass production mix (23%). Data for the representative Turkish grid mix has been used in the model owing to the manufacturing occurring in Bozüyük.

The **ODP** impact comes from the copper use in brass (40%) and paper used in packaging (29%) with minor impacts from the electricity consumption and brass production accounting for about 11% and 12% of the total impact respectively.

The **AP** stems mostly from the electricity grid mix at 65% contribution level. It is also added to from the copper flowing into the brass as well as the primary copper used as raw material (14% and 10% respectively). The impact is mostly due to emissions to air SO_2 and NO_x: 86% from sulphur dioxide and 13% from nitrogen oxides.

The **EP** has almost half of the impact coming from the electricity consumption (45%) The rest of the impact comes from copper flows to brass (21%), paper in packaging (9%) primary copper as raw material (4%) as well as from the zinc mix (7%).

The **POCP** is dominated by the electricity grid mix (57%), copper flows to brass (16%). Primary copper as raw material and zinc contribute about 9% each. The main emissions contributing to this impact category are VOCs (18%), sulphur dioxide (63%) and nitrogen oxides (14%).

The **ADP elements** impact is largely dominated by the copper scrap sourced externally for brass production, amounting to 74% of the total. Other contributors include the primary copper raw material and zinc adding about 7% each to the total impact.

The **ADP fossil** impact is dominated by electricity production (48%) and copper flows to brasses (24%). Minor contributors are the paper in packing (5%), brass production (6%) and zinc (5%) and primary copper (5%) as raw materials.

The total primary energy demand is almost 85% non-renewable and 15% renewable energy resources.
The non-renewable primary energy demand (**PENRT**) is dominated by the copper flows to brass and by the energy consumption during the production of the product itself.

The renewable energy demands (**PERT**) presents a similar profile as the non-renewable; the dominating contributor is the electricity consumption during production processes as well as the copper generation for being used in brass production.

7. Requisite evidence

Chemical and hygienic requirements of the products are applied according to standard /TS 266/. According to this standard, decomposition of Pb, Al, Cu, Ni , Sn, Fe from mixer to water is measured. The obtained test results demonstrated that none of the samples included Pb and Cd which states that the test results for all samples were below the limit values set for Pb, Al, Cu, Ni , Fe, Sn within the scope of /TS 266/. According to standards all parameters are presented in the table below

Chemical Paramete	Unit	Standart limit	Measured
Al	µg/lt	200	<18.0
Cu	µg/lt	2000	<6.0
Fe	µg/lt	200	<7.0
Ni	µg/lt	20	<9.0
Pb	µg/lt	10	<9.0

Also, according to the standard, all materials coming into contact with water intended for human consumption shall not present any risk up to a temperature of 90°C.They shall not any cause any change to the drinking water either in terms of quality, appearance, smell or taste. The test is performed by Turkish Standard Institute. The testing institution is accredited by Türkak (Turkish Accreditation Institute).

8. References

Institut Bauen und Umwelt e.V., Berlin (pub.):

General principles for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2011-09

PCR 2012, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. September 2012

PCR 2012, Part B: Requirements on the EPD Bathroom fittings and showers. July 2013.

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ISO 14025
DIN EN ISO 14025:2011-10: Environmental labels and declarations – Type III environmental declarations – Principles and procedures

EN 15804
DIN EN 15804:2012-04: Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

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DIN EN 50001
DIN EN 50001:2011-12 Energy management systems. Requirements with guidance for use

ISO 9001
ISO 9001:2008 Quality management systems – Requirements

ISO 14001
ISO 14001:2004 Environmental management sys tems – Requirements with guidance for use

OHSAS 18001
OHSAS 18001 Occupational Health and Safety Management System

EN 13501-1
DIN EN 13501-1: 2010-01, Fire test to building material

TS 266
TS 266:1997, Water intended for human consumption

TS EN 200
TS EN 200: 2010-02, Sanitary Tapware: General Technical Specifications For Single Taps And Mixer Taps

TS EN 248
TS EN 248:2011-02, Sanitary Tapware - General Specifications For Electrodeposited Coatings Of Ni-Cr

TS EN 817
TS EN 817: 2012-01, Sanitary Tapware Mechanical Mixers (Pn 10)- General Technical Specifications

TS EN 246
TS EN 246: 2011-11, Sanitary Tapware – General Specifications For Flow Rate Regulators

TS EN 16091
TS EN 16091:2009-06, Sanitary Tapware Electronic Opening and Closing Tapware

BS EN 1982
BS EN 1982:2008-10: , Copper And Copper Alloys – Ingots And Castings

BS EN 12164
BS EN 12164: 2011-06, Copper And Copper Alloys-Rod For Free Machining Purposes

BS EN 12165
BS EN 12165: 2011-06, Copper And Copper Alloys-Wrought And Unwrought Forging Stock

DIN 50930-6
DIN 50930-6: 2011, Corrosion of metallic materials under corrosion load by water inside of pipes, tanks and apparatus

DIN 50018
DIN 50018:1997-06, Sulfur Dioxide Corrosion Testing in A Saturated Atmosphere

BS EN ISO 9227
BS EN ISO 9227: 2012-05, Corrosion Tests in Artificial Atmospheres Salt Spray Tests

BS EN 6988
BS EN 6988:1995, Metallic And Other Non -Organic Coatings -Sulfur Dioxide Test With General Condensation of Moisture

AS/NZS 2345
AS/NZS 2345:2006-06, Australıan Standard Dezincification Resistance Of Copper Alloys

AS/NZS 4020
AS/NZS 4020:2005-11 , Testing Of Products For Use İn Contact With Drinking Water

AS/NZS 6400
AS/NZS 6400:2005, Water Efficient Products – Rating And Labeling

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